

DIRECT TESTIMONY OF

JOSEPH M. LYNCH

ON BEHALF OF

SOUTH CAROLINA ELECTRIC & GAS COMPANY

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Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND CURRENT POSITION WITH SOUTH CAROLINA ELECTRIC & GAS COMPANY (SCE&G or Company).

A. Joseph M. Lynch, 1426 Main Street, Columbia, South Carolina. My current position is Manager of Resource Planning.

Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I graduated from St. Francis College in Brooklyn, New York with a Bachelor of Science degree in mathematics. From the University of South Carolina I received a Master of Arts degree in mathematics, an MBA and a Ph.D. in management science and finance. I was employed by SCE&G as a Senior Budget Analyst in 1977 to develop econometric models to forecast electric sales and revenue. In 1980, I was promoted to Supervisor of the Load Research Department. In 1985, I became Supervisor of Regulatory Research where I was responsible for load research and electric rate design. In 1989, I became Supervisor of Forecasting and Regulatory Research, and, in 1991, I was promoted to my current position of Manager of Resource Planning.

1 **Q. BRIEFLY SUMMARIZE YOUR CURRENT DUTIES.**

2 A. As Manager of Resource Planning I am responsible for producing SCE&G's
3 forecast of energy, peak demand and revenue; for developing the Company's
4 generation expansion plans; and for overseeing the Company's load research
5 program.

6 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

7 A. The purpose of my testimony is to discuss the Company's short run energy sales
8 forecast and to explain how we simulate the operation of our power plants to
9 generate the required energy and project the resulting fuel requirements for the
10 system.

11 **Q. DESCRIBE THE COMPANY'S SHORT-RANGE ENERGY**
12 **FORECASTING PROCESS.**

13 A. As part of its annual planning cycle, each summer the Company updates its short-
14 range and long-range sales forecast. The long-range refers to the full twenty year
15 planning horizon. The short-range refers to the first two years of the planning
16 horizon and is projected monthly. In the short-range methodology, our customers
17 are broken into detailed forecasting groups. We begin by separating customers
18 into categories defined by rate and class. Where possible, customers are further
19 divided into electric space heating and non-electric space heating groups.
20 Residential customers are further separated into those living in either single-
21 family, multi-family or mobile homes. About twenty of our largest industrial
22 customers are forecasted on an individual basis while the balance are separated
23 into 2-digit SIC groups. Exhibit No. __ (JML-1) shows most of the detailed

1 groups. Where a detailed customer group contains a large number of
2 homogeneous customers, separate econometric models are developed to project
3 the number of customers and the average use per customer. All residential groups
4 and small commercial groups are projected in this way. Weather is a significant
5 factor in the residential and commercial models. Projections are based on normal
6 weather where normal is defined as the average taken over the last 15 years.
7 Overall, nearly 100 econometric and statistical models are utilized to develop the
8 short-run forecast.

9 **Q. IS YOUR ENERGY FORECASTING METHODOLOGY TYPICAL FOR**
10 **THE INDUSTRY?**

11 A. Yes, our use of multiple regression and statistical time-series models is fairly
12 standard throughout the industry.

13 **Q. HOW ACCURATE HAS YOUR ENERGY FORECASTING**
14 **METHODOLOGY BEEN?**

15 A. Over the past ten years the mean absolute percent error (MAPE) has been 1.1%
16 when comparing the forecast to the weather normalized actual energy.

17 **Q. WHAT IS YOUR ENERGY FORECAST FOR 2005?**

18 A. We expect our territorial customers to consume 23,473 gigawatthours of energy in
19 2005 with 32% being consumed by our residential customers, 30% by our
20 commercial customers, 29% by our industrial customers and the balance of 9% by
21 the combination of the remaining retail classes and our territorial wholesale
22 customers.

1 **Q. EXPLAIN HOW YOU TRANSLATE THIS ENERGY SALES FORECAST**
2 **INTO A FORECAST OF FUEL REQUIREMENTS FOR THE ELECTRIC**
3 **SYSTEM?**

4 A. We simulate the dispatch of our generating units with the software program
5 PROSYM. PROSYM is licensed with Global Energy Decisions, Inc. It is a well
6 accepted tool in the industry being used by over 100 utilities.

7 **Q. DISCUSS THE PROSYM MODEL INPUTS.**

8 A. The following are key inputs to the model:

- 9 1. Energy Sales Forecast
- 10 2. Fuel Price Data
- 11 3. Generator Operating Parameters
- 12 4. Market Prices.

13 Exhibit No. __ (JML-2) graphically displays these inputs.

14 **Energy Sales Forecast:** I have already described the creation of the monthly
15 energy sales forecast. This is used to create forecasts of hourly loads based on
16 historical hourly load profiles.

17 **Fuel Price Data:** A forecast of monthly fuel prices for coal and oil are provided
18 by the SCE&G Fossil/Hydro Procurement Department. Fuel data includes
19 transportation costs and sulfur content of coal. A forecast of monthly nuclear fuel
20 prices is provided by the SCE&G Nuclear Fuel Management Department. A gas
21 price forecast is created using the Nymex natural gas futures prices. Expected gas
22 transportation costs are added to the Nymex prices to create a forecast of the
23 delivered cost of gas. We are using the prices of the Nymex futures contracts from

1 market close on February 2, 2005. The average price for the twelve contracts,
2 May 2005 through April 2006, was \$6.79 per DTH (dekatherm).

3 **Generator Operating Parameters:** Generator operating parameters include heat
4 rate, capacity, maintenance outage schedule, forced outage rate, and operating
5 constraints. Operating constraints include variables such as minimum up and
6 down times, ramp rates, and start costs. All of these variables control the cost and
7 feasibility of dispatching each unit each hour.

8 **Market Prices:** The market prices for power are input into the model to reflect
9 the opportunities that SCE&G has to purchase power at prices below its marginal
10 cost of generation or to sell power above its marginal cost of generation. The
11 market prices utilized in the model are determined using SCE&G's marginal costs
12 and the marginal costs of utilities in the southeast.

13 **Q. EXPLAIN HOW PROSYM MODELS THE ELECTRIC SYSTEM.**

14 A. PROSYM is a chronological hourly dispatch model. In each hour of a study
15 period, PROSYM arranges all the available supply sources from lowest cost to
16 highest and then determines the least-cost way to meet the customer load in that
17 hour while considering a complex set of operating constraints. The Convergent
18 Monte Carlo method is used to simulate the random unscheduled outages of our
19 plants. This method causes carefully distributed outages throughout each period
20 such that a unit with an outage rate of x% is available exactly (1-x)% of the time.
21 This allows rapid simulation of long periods of time and is tuned to help account
22 for the effect of outages at different times of day and seasons of the year.

23 **Q. WHAT ARE THE PROSYM RESULTS FOR 2005?**

1 A. Based on the PROSYM simulations, we expect to supply 27,813 gigawatthours of
2 energy to the electric grid. This includes losses and energy required for pumping
3 at our pumped storage plant. Of this total supply, we expect about 64% to come
4 from coal, 18% from nuclear, 8% from natural gas, 5% from hydro and 5% from
5 off-system purchases. We expect to burn 6.7 million tons of coal and 16.3 million
6 dekatherms of natural gas.

7 **Q. HOW SENSITIVE ARE THE SYSTEM FUEL COSTS TO THE SYSTEM**
8 **ENERGY NEEDS?**

9 A. Since we dispatch the most economical generating units first, an increase or
10 decrease in sales will occur at the margin and involve the more costly sources of
11 power. We estimate that a 1% change in energy requirements, which is about our
12 average forecast error, will result in about a 2% change in fuel costs assuming, of
13 course, that the only input being changed is the energy needs of our customers.

14 **Q. AFTER RUNNING THE PROSYM MODEL, WHAT IS THE NEXT STEP**
15 **IN YOUR PROCESS?**

16 A. For the purpose of these proceedings, the PROSYM model output that defines
17 how the SCE&G electric system will meet the projected electric load is passed to
18 the Rate Department, which develops the appropriate fuel factor for SCE&G
19 rates. Mr. Hendrix will discuss this subject. The specific data items that are passed
20 to the Rate Department are plant generation, plant average heat rate, heat content
21 of the coal, capacity factors by unit, off system purchases and sales, and
22 associated market prices.

1 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

2 **A. Yes it does.**

Short-Term Forecasting Groups, 2005 – 2006

<u>Class Number</u>	<u>Class Name</u>	<u>Rate/SIC Designation</u>	<u>Comment</u>
10	Residential Non-Space Heating	Single Family	Rates 1, 2, 5, 6, 8, 18, 25, 26, 62, 64
910	Residential Space Heating	Multi Family	Rates 67, 68, 69
		Mobile Homes	Rates 1, 2, 5, 7, 8
20	Commercial Non-Space Heating	Rate 9	Small General Service
		Rate 12	Churches
		Rate 20, 21	Medium General Service
		Rate 22	Schools
		Rate 24	Large General Service
		Other	Rates 10, 11, 14, 16, 17, 18, 24, 25, 26, 29, 60, 62, 64, 67, 68, 69
920	Commercial Space Heating	Rate 9	Small General Service
30	Industrial Non-Space Heating	Rate 9	Small General Service
		Rate 20, 21	Medium General Service
		Rate 23, SIC 22	Textile Mill Products
		Rate 23, SIC 24	Lumber, Wood Products, Furniture and Fixtures (SIC Codes 24 and 25)
		Rate 23, SIC 26	Paper and Allied Products
		Rate 23, SIC 28	Chemical and Allied Products
		Rate 23, SIC 30	Rubber and Miscellaneous Products
		Rate 23, SIC 32	Stone, Clay, Glass, and Concrete
		Rate 23, SIC 33	Primary Metal Industries; Fabricated Metal Products; Machinery; Electric and Electronic Machinery, Equipment and Supplies; and Transportation Equipment (SIC Codes 33-37)
		Rate 23, SIC 91	Executive, Legislative and General Government (except Finance)
		Rate 23, SIC 99	Other or Unknown SIC Code*
		Rate 27, 60	Large General Service
		Other	Rates 25 and 26
930	Industrial Space Heating	Rate 9	Small General Service
60	Street Lighting	Rates 3, 9, 13, 17, 25, 26, 29, and 69	
70	Other Public Authority	Rate 3 and 29	
		Rates 65 and 66	
92	Municipal	Rate 60, 61	Four Individual Accounts
97	Cooperative	Rate 60, 61	Three Individual Accounts

* Includes small industrial customers from all SIC classifications that were not previously forecasted individually.

Note: Industrial Rate 23 also includes Rate 24. Commercial Rate 24 also includes Rate 23.

